(12) UK Patent Application (19) GB (11) 2 282 216 (13) A

(43) Date of A Publication 29.03.1995

(21) Application No 9415507.4

(22) Date of Filing 01.08.1994

(30) Priority Data
(31) 05221753 (32) 07.09.1993 (33) JP

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(51) INT CL[6]
F25C 1/22

(52) UK CL (Edition N)
F4H HD2 HD7A HD7C

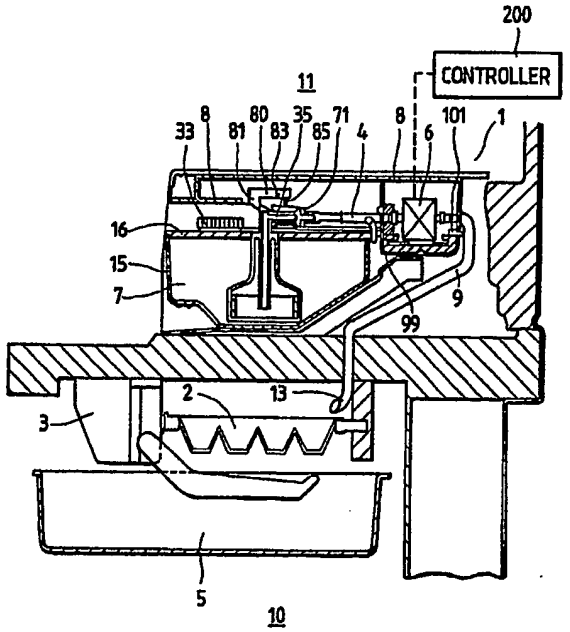
(56) Documents Cited
US 4987746 A US 4815941 A US 4027499 A

(58) Field of Search
UK CL (Edition M) F4H
INT CL[5] F25C
ONLINE DATABASE:WPI

(54) Ice making device

(57) An ice making device includes an enclosed feed water tank 7 designed to store therein water, an ice tray 2, disposed in a refrigerator, storing therein water for making ice, a pump 6 for pumping the water out of the enclosed feed water tank to the ice tray, a water supply line extending from the enclosed feed water tank to the ice tray through the pump, and a controller 200 controlling the pump to supply a preselected amount of water to the ice tray. The water supply line includes a first line 4 connecting between the inside of the enclosed feed water tank and an inlet of the pump and a second line 9 arranged to establish communication between an outlet of the pump and the ice tray.

FIG. 2



GB 2 282 216 A

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

FIG. 1

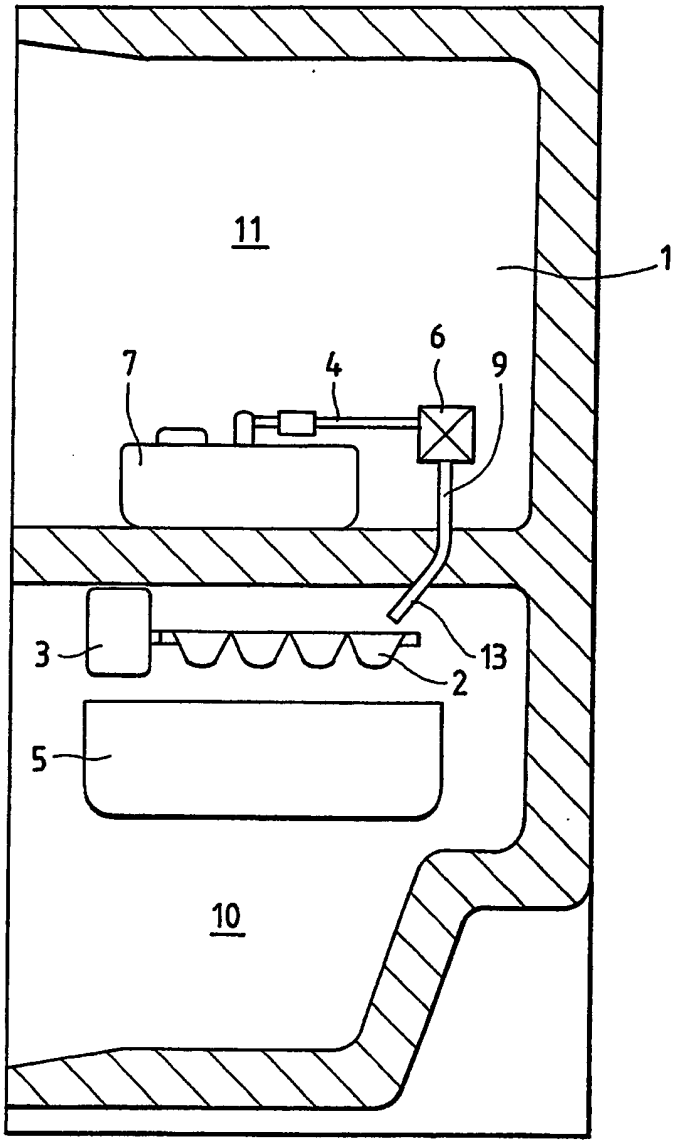


FIG. 2

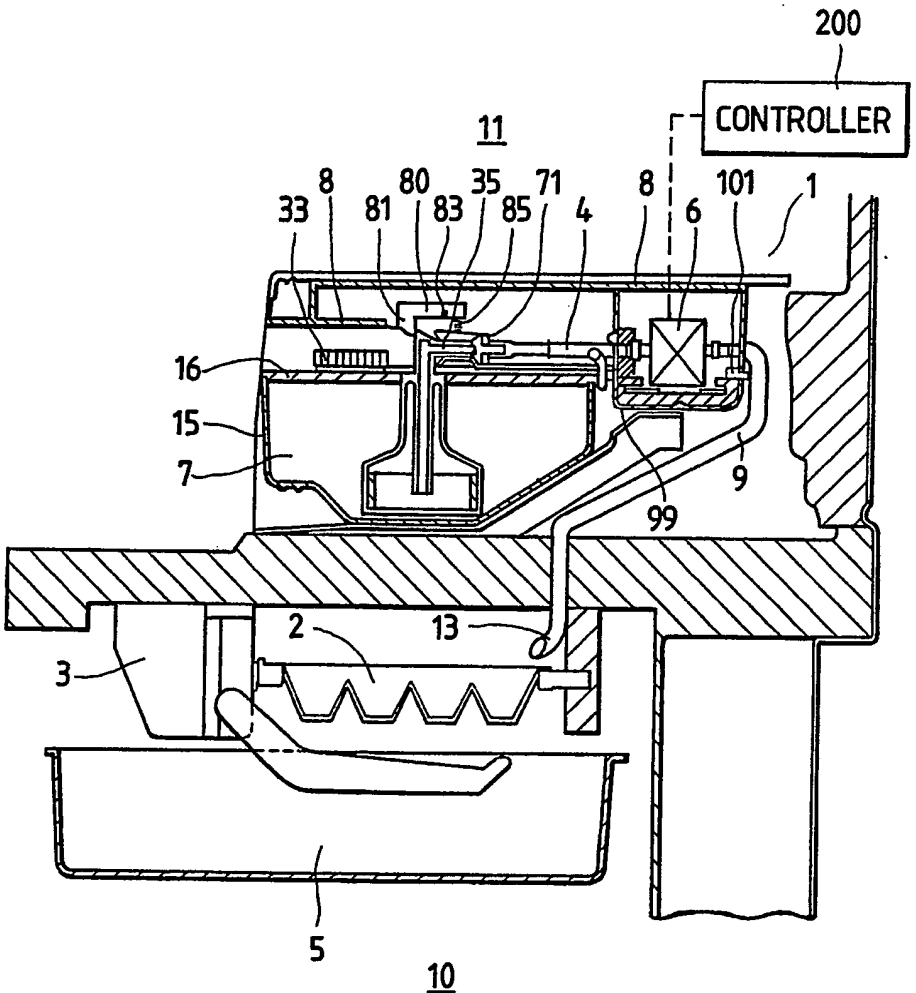

200
CONTROLLER
11
33
8
81
80
83
35
85
71
4
8
6
101
1
16
15
7
9
99
2
13
3
5
10

FIG. 3

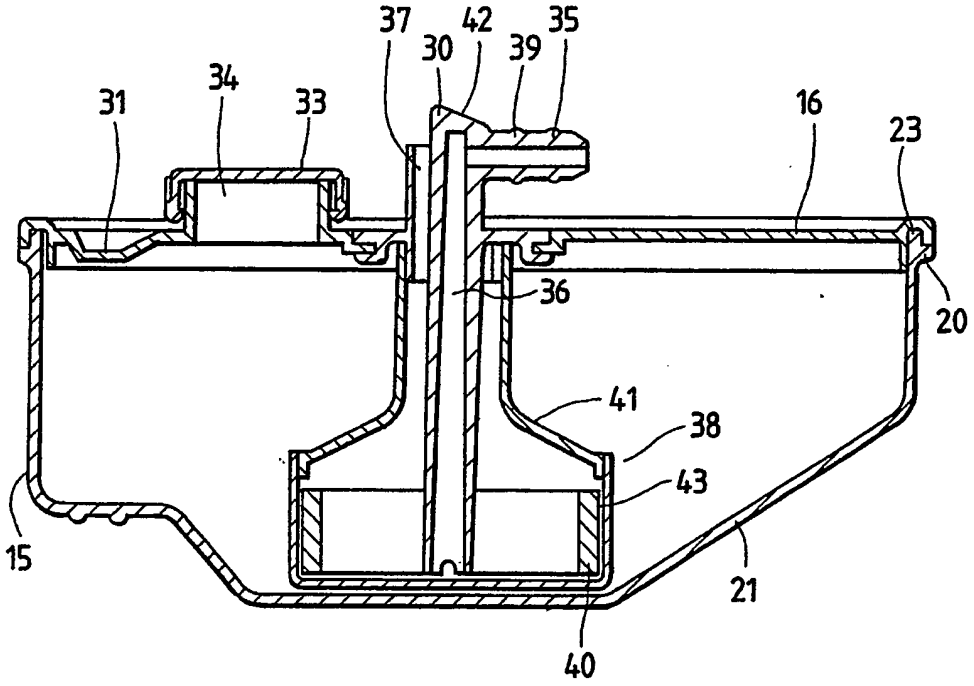


FIG. 4

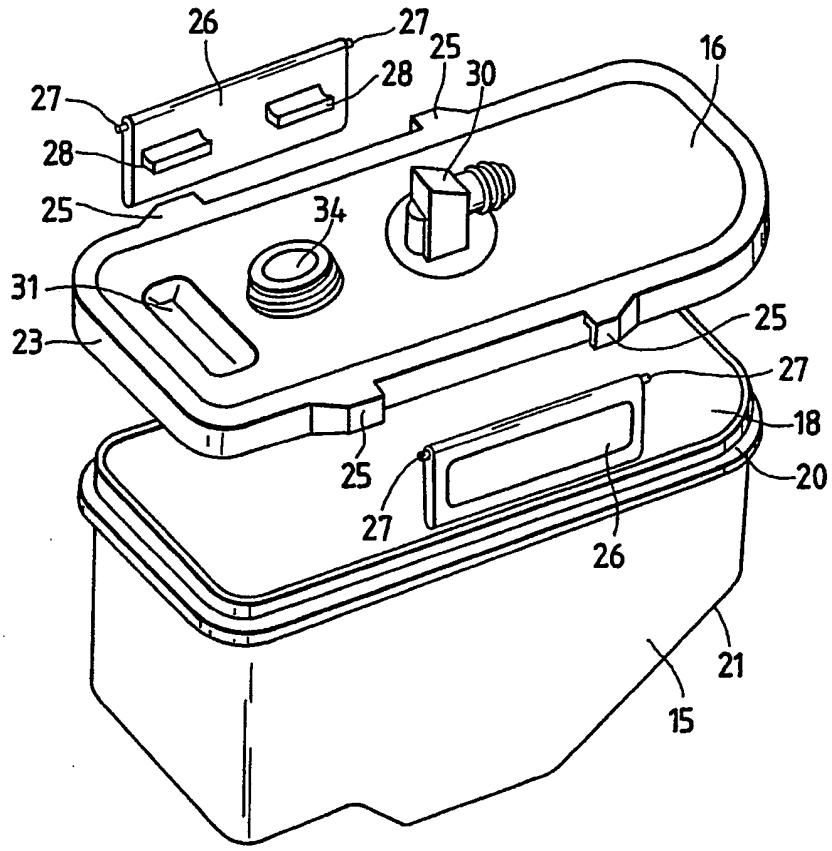


FIG. 5

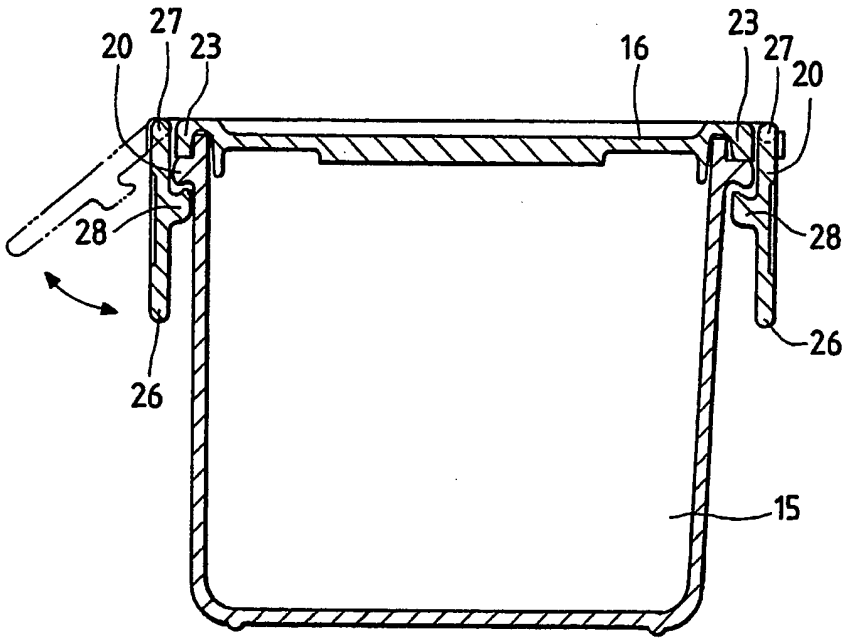


FIG. 6

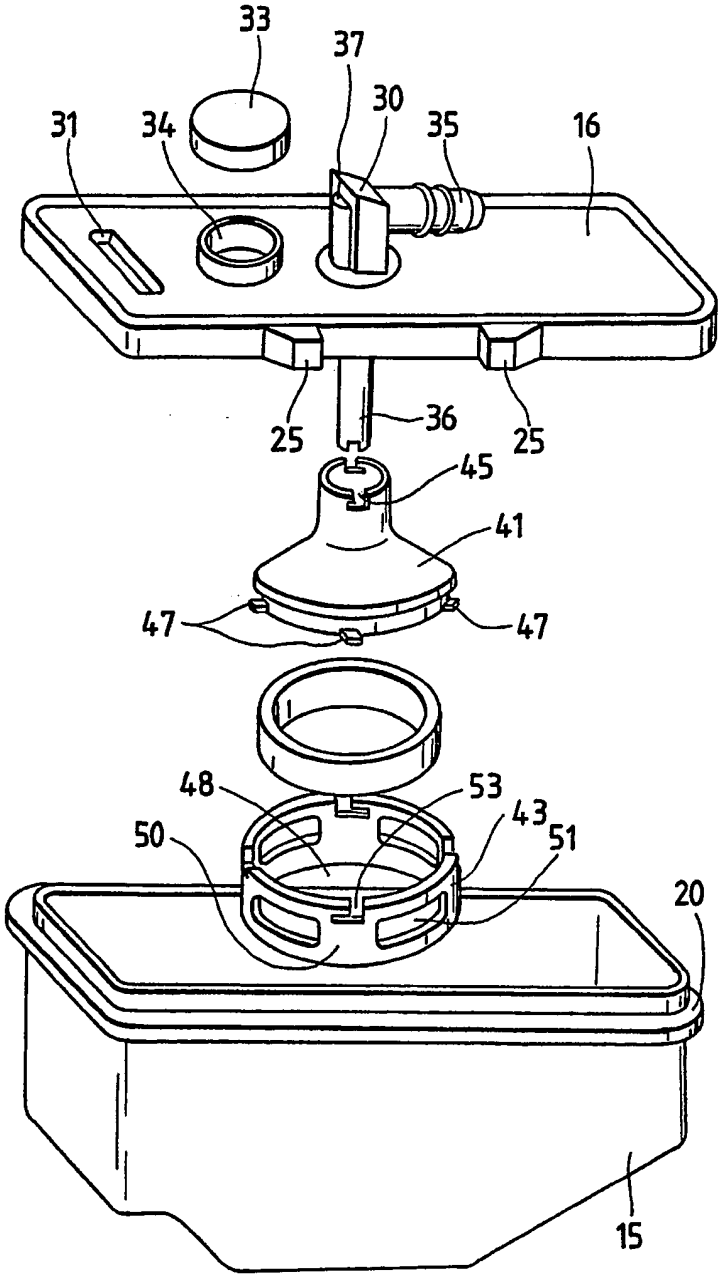


FIG. 7

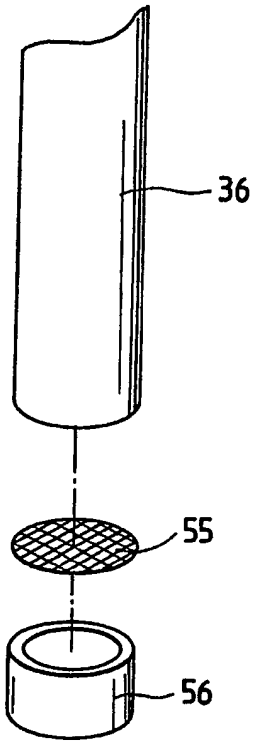


FIG. 8

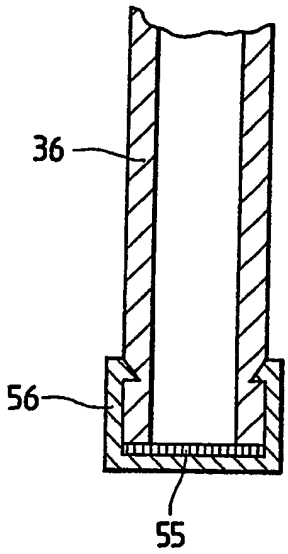


FIG. 9

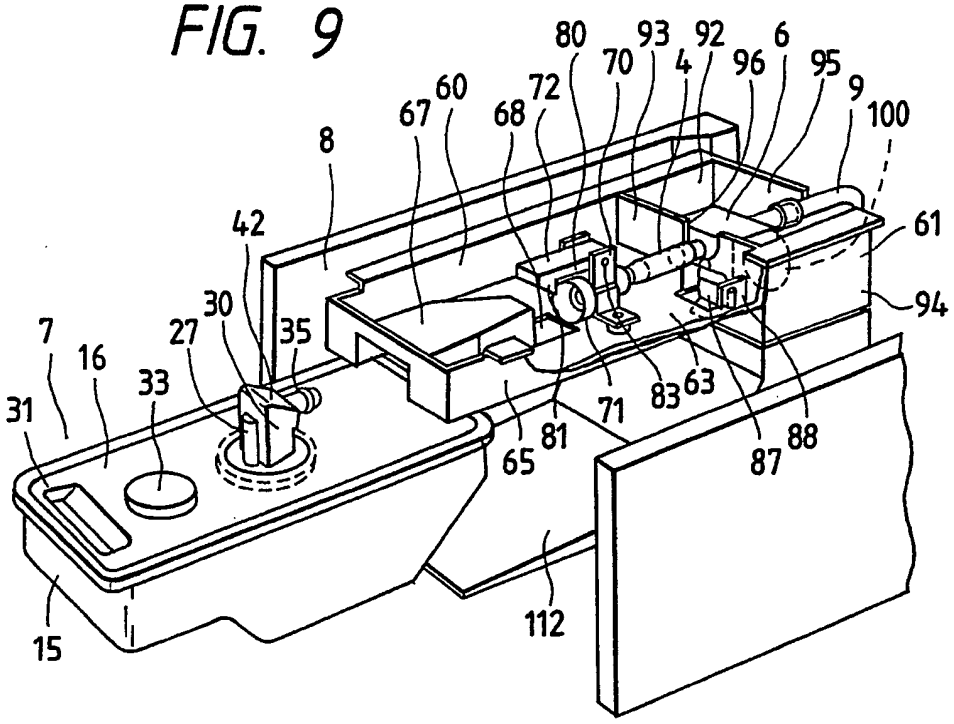

80
93
92
6
70
4
96
95
9
100
67
60
68
72
8
42
61
94
30
27
35
7
16
33
31
71
83
63
65
81
87
88
15
112

FIG. 10

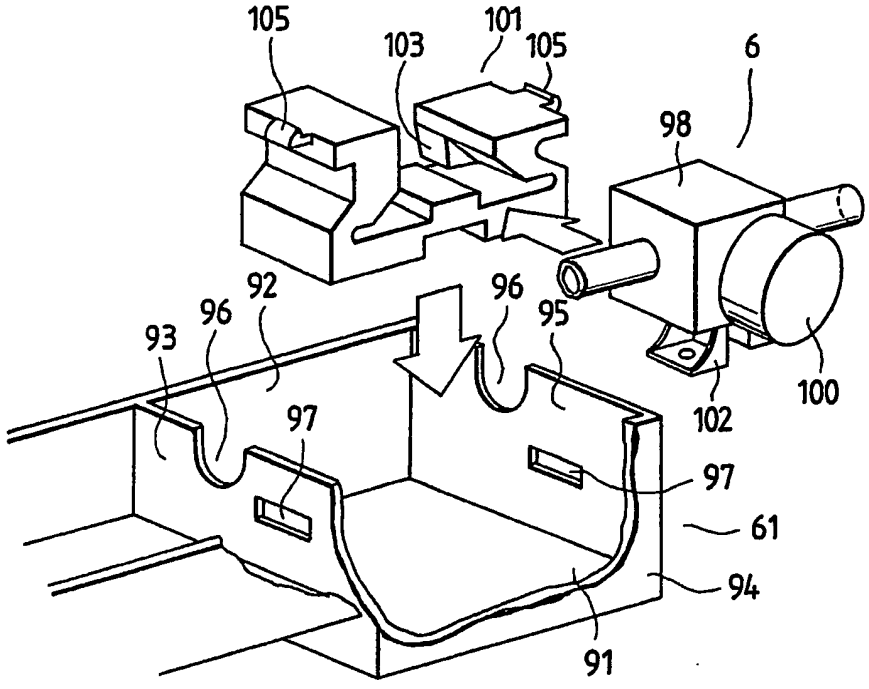

105
103
101
105
6
98
92
96
96
95
93
97
100
102
97
61
94
91

FIG. 11

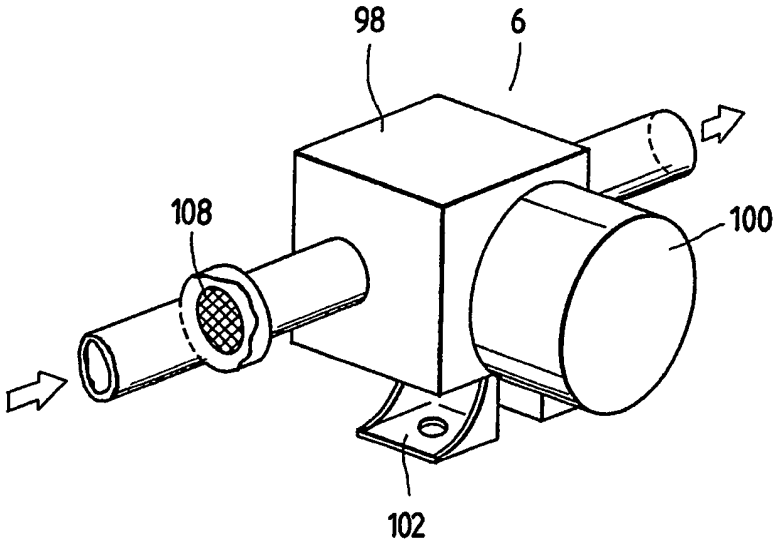


FIG. 12

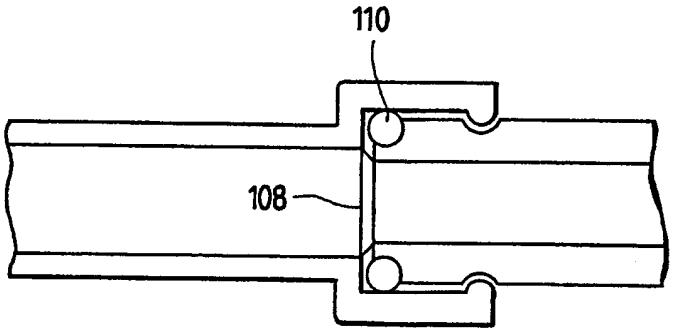


FIG. 13

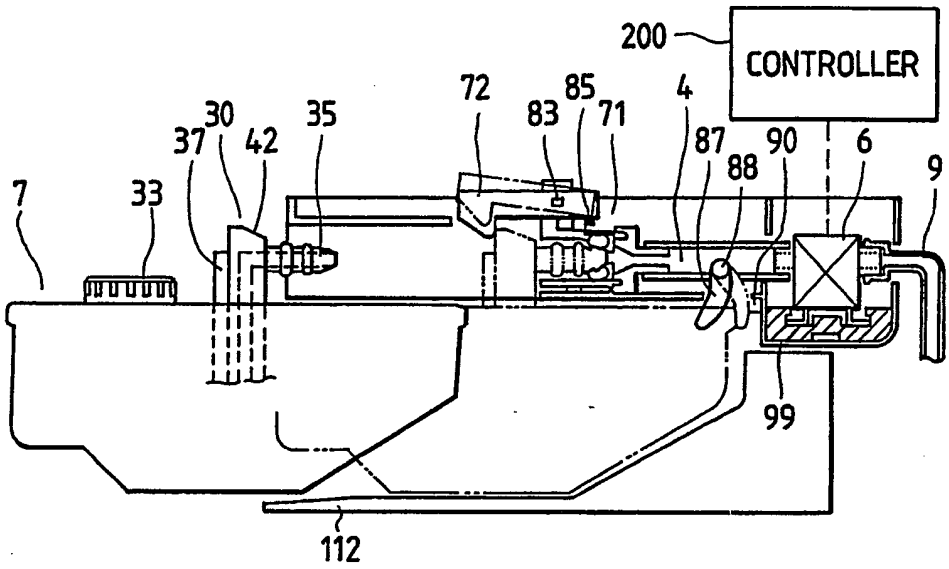

200
CONTROLLER
72
85
4
30
35
83
71
37
42
87
90
6
88
9
7
33
99
112

FIG. 14

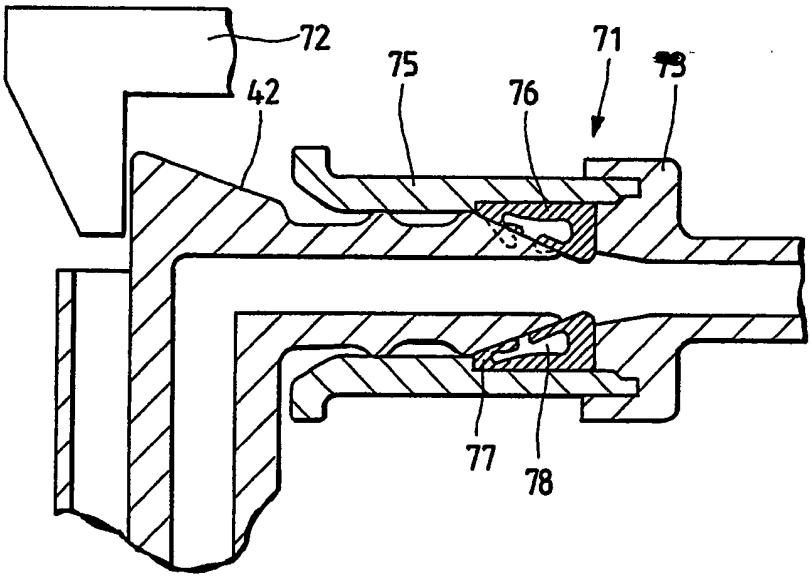

72
71
75
73
42
76
77
78

FIG. 15

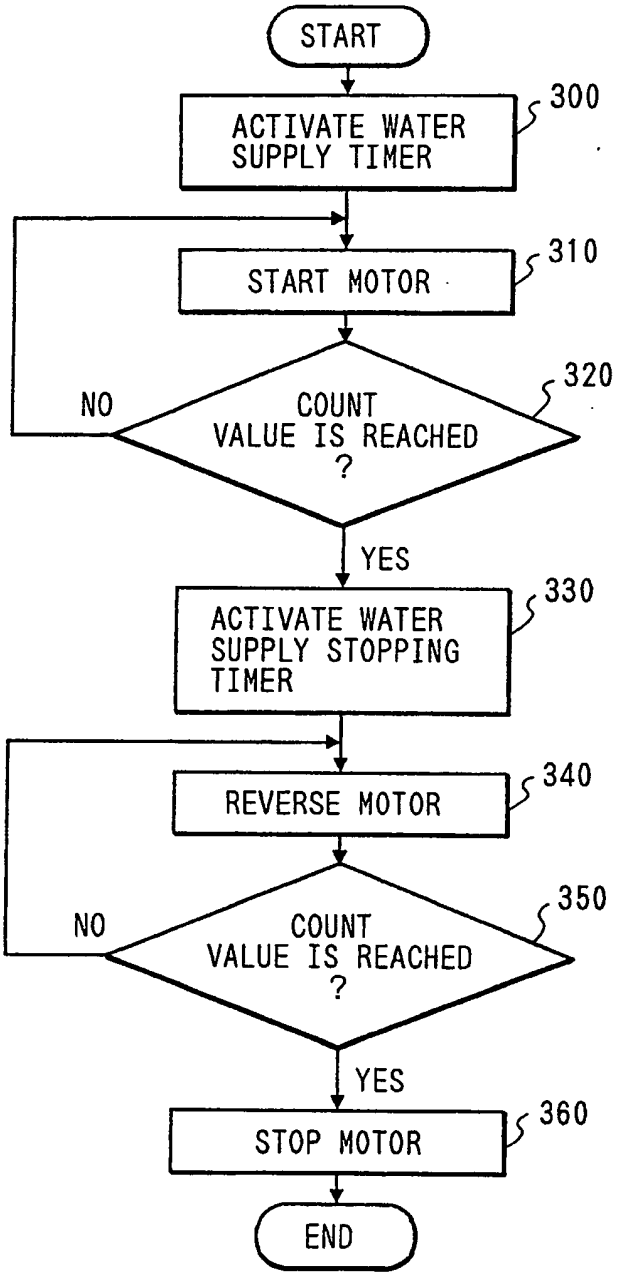
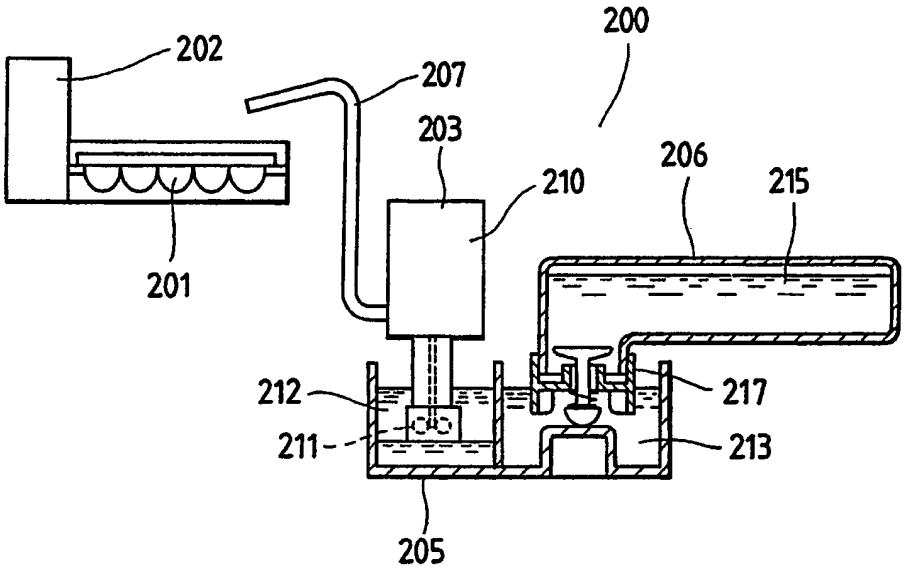

START
ACTIVATE WATER SUPPLY TIMER
300
START MOTOR
310
NO
COUNT VALUE IS REACHED ?
320
YES
ACTIVATE WATER SUPPLY STOPPING TIMER
330
REVERSE MOTOR
340
NO
COUNT VALUE IS REACHED ?
350
YES
STOP MOTOR
360
END

FIG. 16
PRIOR ART



ICE MAKING DEVICE

The present invention relates generally to an ice making device which may be employed in a refrigerator, and more particularly to an improved structure of an automatic ice making device with a dustproof water supply system.

Japanese Utility Model First Publication No. 51-3082 discloses a conventional ice making device for use in a refrigerator.

Fig. 16 shows the ice making device 200 taught in the above publication. The ice making device 200 includes generally an ice tray 201, a reversing unit 202, a pump 203, a measuring tank 205, a feed water tank 206, and a feed pipe 207. The ice tray 201 and the reversing unit 202 are arranged in a freezer compartment, while the others are disposed in a refrigerator compartment.

The reversing unit 202 includes a gear train which turns the ice tray 201 upside down and applies torsion thereto for separating ice.

The measuring tank 205 defines therein a measuring chamber 212 and a water reservoir 213. A small hole is formed to communicate between the measuring chamber 212 and the water reservoir 213. When a water level in the measuring chamber 212 is lowered, it will cause the water in the water reservoir 213 to flow slowly to the measuring chamber 212.

The pump 203 is provided with a centrifugal pump which includes a motor 210 and a pump body 211. The centrifugal pump generally does not have a self-suction function and thus, the pump

body 211 must be arranged inside the measuring chamber 212.

The feed water tank 206 includes a tank body 215 and a cover 217. The cover 217 has a valve which is opened in contact with a protrusion formed on the bottom of the water reservoir 213 to communicate between the feed water tank 206 and the water reservoir 213.

With the above arrangements, the water in the feed water tank 206 flows into the measuring chamber 212 through the water reservoir 213 so that the measuring tank 205 is filled with the water. The water in the measuring tank 205 is pumped by the pump 203 so that it is supplied to the ice tray 201 through the feed pipe 207.

The above prior art ice making device 200, however, has suffered from drawbacks in that the water in the measuring tank 205 tends to stagnate, causing ice to issue offensive odours for the following reasons.

The prior art ice making device 200 requires the measuring tank 205. The water in the measuring tank 205 is, as is clear from the drawing, exposed to the air through an upper opening of the measuring tank 205. Additionally, the water is not constantly supplied to the ice tray 201, and it may sometimes be left in the measuring tank 205 for a long time when an ice consumption is low so that the water in the measuring tank 205 is not replaced often. Dust floating in the refrigerator will fall into the water in the measuring tank 205. Further, gas with offensive odors in the refrigerator may be absorbed in the water in the measuring

tank 205 from the upper opening thereof, causing ice produced to generate offensive odours.

It is therefore a principal object of the present invention to avoid the disadvantages of the prior art.

According to the present invention, there is provided an ice making device which comprises an enclosed feed water tank designed to store therein water, an ice tray, disposed in a refrigerator, storing therein water for making ice, a pump for pumping the water out of the enclosed feed water tank to the ice tray, a water supply line extending from the enclosed feed water tank to the ice tray through the pump, the water supply line including a first line connecting between the inside of the enclosed feed water tank and an inlet of the pump and a second line arranged to establish communication between an outlet of the pump and the ice tray, and a controller for controlling the pump to supply the water from the feed water tank to the ice tray.

Thus the present invention can provide an improved structure of an ice making device wherein water in a water supply system is hardly exposed to the air for preventing motes of dust floating in a refrigerator from entering the water in the water supply system, which may cause the water to rot and issue offensive odours.

In a preferred mode, the controller controls the pump to return the water in the water supply line back to the feed water tank after a preselected amount of water is supplied to the ice tray.

The feed water tank may be arranged in the refrigerator detachably

therefrom. The feed water tank may include a discharge pipe communicating with the inside thereof which has a first joint. In which case the first line of the water supply line has a second joint designed to establish tight engagement with the first joint of the discharge pipe when the feed water tank is mounted in the refrigerator.

In some embodiments the first joint includes a nozzle, while the second joint is formed with a hollow cylindrical member designed to receive therein the first joint. The second joint includes therein a sealing member for establishing liquid-tight engagement between the first and second joints.

The feed water tank may include therein a filter casing and a filter. The filter casing is designed to have capacity corresponding to the preselected amount of water supplied to the ice tray. An end of the discharge pipe opposite the first joint may be inserted into the filter.

A housing may be further provided which includes a feed water tank mounting portion and a pump mounting portion. The feed water tank mounting portion mounts therein the feed water tank detachably. The pump mounting portion encloses therein the pump.

A drain hole may be formed in a bottom plate of the pump mounting portion.

A vibration-proofing member may be further provided which supports the pump in the pump mounting portion of the housing.

An engaging member may be provided in the housing which is designed to hold tight engagement between the first and second

joints when the feed water tank is inserted into the feed water tank mounting portion of the housing.

A pressure member may be provided in the housing which provides a preselected load to the feed water than when inserted into the housing.

The feed water tank includes a tank body and a cover detachably mounted on the body. The cover hermetically seals the tank body.

A discharge pipe storage portion may be provided in the feed water tank mounting portion of the housing. The discharge pipe storage portion is adapted for guiding movement of the feed water tank to establish the engagement between the first and second joints of the first and second lines when the feed water tank is inserted into the feed water tank mounting portion.

The present invention will be understood more fully from the detailed description given hereinbelow and from the accompanying drawings of the preferred embodiment of the invention, which, however, should not be taken to limit the invention to the specific embodiment but are for the purpose of explanation and understanding only.

In the drawings:

Fig. 1 is a schematic illustration which shows an ice making device according to the present invention;

Fig. 2 is a cross-sectional view which shows an ice making device of the invention;

Fig. 3 is a cross-sectional view which shows a feed water tank

of an ice making device;

Fig. 4 is a perspective view which show the feed water tank, as shown in Fig. 3;

Fig. 5 is a cross-sectional view which shows the feed water tank, as shown in Fig. 4;

Fig. 6 is an exploded perspective view which shows the feed water tank, as shown in Fig. 4;

Figs. 7 and 8 are illustrations which show an alternative structure of an end of a discharge pipe inserted into a feed water tank;

Fig. 9 is a partly perspective view which shows an essential part of an ice making device of the invention;

Fig. 10 is a perspective view which shows a mounting structure of a pump of an ice making device;

Fig. 11 is perspective view which shows a pump of an ice making device of the invention;

Fig. 12 is a cross-sectional view which shows a connection between an outlet of a pump and a feed pipe connected to a feed water tank;

Fig. 13 is a schematic illustration for explaining insertion of a feed water tank into a housing;

Fig. 14 is a cross-sectional view which shows a connection between joints of a feed water tank and a pump;

Fig. 15 is a flowchart which shows logical steps performed by a controller of an ice making device of the invention; and

Fig. 16 is a schematic illustration which shows a conventional

ice making device.

Referring now to the drawings, wherein like numbers refer to like parts in several views, particularly to Fig. 1, there is shown an automatic ice making device 1 according to the present invention which may be built in a refrigerator.

The ice making device 1 includes generally an ice tray 2, a reversing unit 3, a storage basket 5, a pump 6, a feed water tank 7, and feed pipes 4 and 9. The ice making device 1, as can be seen from the drawing, has no measuring tank which is essential to the prior art ice making device, as discussed in the introductory part of this application.

The ice tray 2, the reversing unit 3, and the storage basket 5 are arranged in a freezer compartment 10 of a refrigerator, while the pump 6 and the feed water tank 7 are disposed in a refrigerator compartment 11 provided above the freezer compartment 10. The feed pipe 4 connects between the feed water tank 7 and the pump 6. The feed pipe 9 includes a nozzle 13 oriented to the ice tray 2 for supplying water thereinto.

The ice tray 2, the reversing unit 3, and the storage basket 5 can be of any known structure. In brief, the ice tray 2 is designed to freeze water supplied therein to form a plurality of block ices. The reversing unit 3 includes therein a gear train which turns the ice tray 2 upside down for separating therefrom the block ices into the storage basket 5.

The feed water tank 7, as shown in Fig. 2, includes a tank body 15 made of such as sterene-acrylonitril resin, a cover 16 made

of the same resin, and a filter (not shown). The tank body 15, as can be seen in Fig. 4, has an upper opening 18 and a flange 20 formed on an end wall around the opening 18. The bottom of the tank body partially projects downward and has an upward-inclined wall 21 extending over approximately one-third of the length of the bottom.

The cover 16 is formed with a plate member contoured to engage the opening 18 of the tank body 15 to hermetically seal it, and includes a rim 23, formed around an edge of the plate member, extending vertically. A seal ring (not shown) is mounted inside the rim 23. The cover 16 further includes two pairs of protrusions 25 and a pair of locking members 26. The protrusions 25 are formed on a circumferential surface of the rim 23 so as to be opposed to each other. Each locking member 26 is formed with a plate member and includes support pins 27. The support pins 27 are fitted into bearing holes (not shown) formed in surfaces of the protrusions 25 opposed to each other for pivotably supporting the locking member 26. On the reverse surface of each locking member 26, a pair of engaging claws 28 are formed which engage, as shown in Fig. 5, the lower surface of the flange 20 of the tank body 15 to establish liquid-tight engagement therebetween.

Additionally, the cover 16 has, as shown in Fig. 4, a water filling hole 34 and a concavity 31 formed in its upper surface. The water filling hole 34 is, as shown in Figs. 3 and 6, covered with a cap 33. The concavity 31 serves as a grip for sliding the feed water tank 7 out of the refrigerator compartment 11. The cover 16 also

has a hole into which an L-shaped discharge pipe 30 is inserted. The discharge pipe 30 includes, as shown in Fig. 6, a nozzle-like pipe joint 35, a draft pipe 36 and an air vent pipe 37. The draft pipe 36, as shown in Fig. 3, extends onto the bottom of the tank body 15. The pipe joint 35 extends perpendicular to the draft pipe 36 and has barbed protrusions 39 formed thereon for assuring liquid-tight engagement with the feed pipe 4. The discharge pipe 30 also has a top surface 42 inclined downward to the pipe joint 35. The air vent pipe 37 communicates between the inside of the tank body 15 and the outside thereof.

Internally, the feed water tank 7, as shown in Figs. 3 and 6, has disposed therein a filter casing 38 and a ring-shaped filter 40. The filter casing 38 includes a funnel-like member 41 and a storage member 43. The funnel-like member 41 has, as shown in Fig. 6, a pair of engaging grooves 45 formed in an end of a fine cylindrical portion thereof for retaining itself on a seat of the discharge pipe 30. Additionally, the funnel-like member 41 also has four engaging protrusions 47 formed around a peripheral surface of a skirt-like portion thereof. The storage member 43 of the filter casing 38 is formed with a cylindrical member including a bottom 48 and a ring-shaped side wall 50. The side wall 50 has four openings 51 formed therein at regular intervals for introduction of water and four L-shaped engaging grooves 53 provided in an edge thereof between the openings 51. The filter casing 38 is assembled by fitting the engaging protrusions 47 of the funnel-like member 41 into the grooves 53 of the storage member 43. The disassembly of the filter

casing 38 is accomplished by slightly turning the storage member 43 out of engagement between the engaging grooves and the engaging protrusions 47.

Inside the filter casing 38, the filter 40 is arranged which is provided with activated carbon having a deodorization function. The filter 40 has a relatively small water passage area so that water passes therethrough slowly. The filter 40, as mentioned above, is disposed within the filter casing 38, and an opening end of the draft pipe 36 of the discharge pipe 30, as clear from Fig. 3, is inserted into the central portion of the filter 40.

It is advisable that the unobstructed capacity of the filter casing 38 without the filter 40 substantially be equal to a necessary supply of water to the ice tray 2. In practice, the amount of water occupying from the surface to the end of the draft pipe 36 within the filter casing 38 preferably be the same as at a full level of the ice tray 2. It should be noted that the filter casing 38 and the filter 40 are not limited to the ones as shown in the drawings, and that they may alternatively be provided with any other simple construction. For example, a mesh filter 55, as shown in Figs. 7 and 8, may be mounted directly on the opening end of the draft pipe 36 using a cap 56.

Referring back to Fig. 2, a housing 8 is disposed in the refrigerator compartment 11. The housing 8 is formed with a resin-made frame which includes, as shown in Fig. 9, a feed water tank mounting portion 60 and a pump mounting portion 61.

The feed water tank mounting portion 60 includes a bottom

plate 63 and a side wall 65. An end portion of the bottom plate 63 is pressed to form a discharge pipe storage portion 67 which has tapered surfaces oriented toward the center of the feed water tank mounting portion 60. In the bottom plate 63, an opening 68 is formed adjacent a top end of the discharge pipe storage portion 67.

Around the opening 68 of the feed water tank mounting portion 60, a pipe joint 71 and a hook are mounted by a support plate 70. The pipe joint 71, as shown in Fig. 14, includes a flange-like base 73 and a tubular member 75 having an end inserted into the flange-like base.

Inside the pipe joint 71, a sealing member 76 is disposed which is made of an elastic material such as rubber or resin, and includes a cylindrical surface, a flat surface, and lip portions 77 and 78. The cylindrical surface is in contact with an inner wall of the tubular member 75, while the flat surface engages the base 73. The lip portions 77 and 78 extend from the cylindrical surface and the flat surface, respectively so as to face each other to offer the so-called double seal function.

The hook 72, as shown in Fig. 9, includes a plate member 80 and a claw 81 formed on an end of the plate member 80. The hook 72 is pivotably supported by a shaft 83 and is always urged downward by a spring 85, as shown in Figs. 2 and 13.

Provided on the feed water tank mounting portion 60 near the pump mounting portion 61 is a pressure lever 87 which is pivotably supported by a shaft 88 on the housing 8. The pressure lever 87 has a top end project downward from an opening formed in the bottom

plate 63 of the housing 8 and is biased by a spring 90 away from the pump mounting portion 61.

The pump mounting portion 61, as shown in Fig. 10, includes a bottom plate and four side plates 92, 93, 94, and 95, defining an upper opening. The pump mounting portion 61 is designed to be deeper than the feed water tank mounting portion 60. In the bottom plate 91 of the pump mounting portion 61, a drain hole 99 is formed. Additionally, in the side plates 93 and 95, cut-out portions 96 for passage of inlet and outlet pipes of the pump 6 and mount holes 97 (as will be described hereinafter in detail).

The pump 6 is a geared pump including a pump body 98 and a motor 100, and has a self-suction function. The pump 6 is mounted on the pump mounting portion 61 of the housing 8 through a vibration proofing mount 101. The vibration proofing mount 101 is formed with a block rubber having a slit 103 extending in the widthwise direction through which sides of the pump body 98 and legs 102 thereof are fitted. The pump 6 may alternatively be provided with a vane-type pump, an axial piston pump, or a diaphragm pump.

The vibration proofing mount 101 has a pair of hooks 105 formed on its both sides. The pump 6 is mounted by inserting it into the slit 103 of the vibration proofing mount 101 and arranging the vibration proofing mount 101 on the housing 8 so that the hooks 105 may engage the mount holes 97 formed in the side plates 93 and 95 of the pump mounting portion 61. With this arrangement, the pump 6 is covered with the vibration proofing mount 101

completely which is surround by the bottom plate 91 and the side plates 92, 93, 94, and 95. This reduces a pumping noise leaking out of the housing 8.

The feed pipe 4 connects between the inlet pipe of the pump 6 and the pipe joint 71. The feed pipe 4, as shown in Figs. 11 and 12, has a filter 108 mounted between itself and the inlet pipe of the pump 6 through an O-ring 110 for liquid-tight engagement therebetween. It is advisable that the filter be on the order of 100 meshes.

The outlet pipe of the pump 6 communicates through the feed pipe 9 with the nozzle 9 opening to the ice tray 2.

An operation of the ice making device 1 of the invention will be discussed below.

First, the cap 33 is removed from the feed water tank 7, water being supplied thereinto from the water filling hole 34.

When the interior of the feed water tank 7 is dirty, it may be cleaned by releasing the engaging claws 28 of the locking member 26 from the flange 20 of the tank body 15. Additionally, since the mounting of the storage member 43 of the filter casing 38 in the feed water tank 7 is, as stated above, accomplished by fitting the engaging protrusions 47 of the funnel-like member 41 into the L-shaped grooves 53, the filter casing 38 is easily disassembled by turning the storage member 43 slightly for cleaning them.

After supplying water into the feed water tank 7, it is mounted in the housing 8. This mounting is, as shown in Figs. 9 and 13, accomplished by inserting the feed water tank 7 horizontally into

between the bottom plate 63 of the feed water tank mounting portion 60 of the housing 8 and a bottom plate 112 of the refrigerator compartment 11. Upon insertion of the feed water tank 7, the discharge pipe 30 is advanced from the opening of the discharge pipe storage portion 67 along the tapered surfaces while being held by the side walls of the discharge pipe storage portion 67 tightly without any play in the lateral direction, so that it faces the opening 68 while the front end of the tank body 15 engages the pressure lever 87.

When the discharge pipe 30 is further pushed against a spring force of the pressure lever 87, it will cause the top surface 42 thereof to lift up the hook 72, as shown by a broken line in Fig. 13, into tight engagement between the hook 72 and the back surface of the discharge pipe 30, so that the pipe joint 35 connects with the pipe joint 71.

When the pipe joint 35 is, as shown in Fig. 14, inserted into the pipe joint 71 completely, it will cause the top end of the pipe joint 35 to engage the two lips 77 and 78 of the sealing member 76 to establish liquid-tight engagement therebetween. In addition, the barbed protrusions 39 of the pipe joint 35 also engage the inner wall of the pipe joint 71 to enhance the liquid-tight engagement therebetween.

During the insertion of the feed water tank 7 into the housing 8, the spring load of the pressure lever 87, as appreciated from the above discussion, acts on a hand of an operator until the hook 72 of the feed water mounting portion 60 has engaged the discharge pipe

30 completely. Thus, the operator can perceive that the feed water tank 7 has been mounted in place in the absence of the spring load.

After the feed water tank 7 is mounted, water stored in the feed water tank 7 is automatically supplied to the ice tray 2 according to logical steps, as shown in a flowchart of Fig. 15, performed by a controller 200.

First, in step 300, a water supply timer is initiated. The routine then proceeds to step 310 wherein the motor 100 of the pump 6 is activated to rotate in a normal direction so that the water is pumped out of the feed water tank 7 to the ice tray 2 through the nozzle 13. Afterwards, the routine proceeds to step 320 wherein it is determined whether the water supply timer reaches a preselected count or not. If a NO answer is obtained, then the routine returns back to step 310. Alternatively, If a YES answer is obtained meaning that the ice tray 2 is filled with the water from the feed water tank 7, then the routine proceeds to step 330 wherein a water supply stopping timer is initiated. The routine then proceeds to step 340 wherein the motor 100 of the pump 6 is switched to the reverse direction to stop the water supply to the ice tray 2.

In the ice making device 1 of this embodiment, the amount of water supplied to the ice tray 2 is regulated by controlling the number of rotations of the motor 100 according to a count value of the water supply timer. Since the pump 6 is, as explained above, a geared pump, it provides a discharge rate substantially proportional to the total number of rotations. Thus, a desired discharge rate of

the motor 100 is determined by setting the number of rotations thereof. Alternatively, the capacity of the filter casing 38 may be set equal to the necessary supply of water to the ice tray 2. In this case, after the pump 6 outputs the necessary supply of water from the feed water tank 7, a water level in the filter casing 38 falls temporary, so that the pump 6 sucks in air in the filter casing 38 to stop supplying the water to the ice tray 2. With this arrangement, the water supply to the ice tray 2 can be controlled more precisely.

After step 330, the routine proceeds to step 350 wherein it is determined whether the water supply stopping timer reaches a given count or not. This count is smaller than the preselected count of the water supply timer. If a NO answer is obtained, then the routine returns to step 340 wherein the motor 100 remains rotating in the reverse direction to return the residual water in the feed pipes 4 and 9 back to the feed water tank 7 for keeping the water clean.

In step 350, if the water supply stopping time reaches the given count, then the routine proceeds to step 360 wherein the motor 100 is stopped.

After the above sequential water supply processes, the water in the ice tray 2 is frozen and then the ice tray 2 is reversed by the reversing unit 3 to have the block ices fall into the storage basket 5 as a conventional ice making device does.

As apparent from the above discussion, water in the ice making device 1 of the invention is hardly exposed to the air for an extended period of time between water supply and subsequent

water supply. Therefore, dust floating in the refrigerator may not enter the water in the ice making device 1 and gas issuing offensive odors may also not be mixed therewith, which will lead to water contamination.

While the present invention has been disclosed in terms of the preferred embodiment in order to facilitate better understanding thereof, it should be appreciated that the invention can be embodied in various ways without departing from the principle of the invention. Therefore, the invention should be understood to include all possible embodiments and modifications to the shown embodiments which can be embodied without departing from the principle of the invention as set forth in the appended claims.

CLAIMS

1. An ice making device comprising:

an enclosed feed water tank for storing therein water;

an ice tray, disposed in a refrigerator, for storing therein water for making ice;

a pump for pumping water out of said enclosed feed water tank to said ice tray;

a water supply line extending from said enclosed feed water tank to said ice tray through said pump, said water supply line including a first line connecting between the inside of said enclosed feed water tank and an inlet of said pump and a second line arranged to establish communication between an outlet of said pump and said ice tray; and

a controller for controlling said pump to supply the water from said feed water tank to said ice tray.

2. An ice making device according to claim 1, wherein said controller controls said pump to return the water in said water supply line back to said feed water tank after a preselected amount of water is supplied to said ice tray.

3. An ice making device according to claim 1 or 2, wherein said feed water tank is arranged in the refrigerator detachably therefrom, said feed water tank including a discharge pipe communicating with the inside thereof, said discharge pipe having a

first joint, the first line of said water supply line having a second joint designed to establish tight engagement with the first joint of said discharge pipe when the feed water tank is mounted in the refrigerator.

4. An ice making device according to claim 3, wherein said first joint includes a nozzle, said second joint being formed with a hollow cylindrical member designed to receive therein said first joint, said second joint including therein a sealing member for establishing liquid-tight engagement between the first and second joints.

5. An ice making device according to claim 3 or 4, wherein said feed water tank includes therein a filter casing and a filter, the filter casing being designed to have capacity corresponding to the preselected amount of water supplied to said ice tray, an end of said discharge pipe opposite said first joint being inserted into the filter.

6. An ice making device according to claim 3, 4 or 5, further comprising a filter attached to an end of the discharge pipe within said feed water tank.

7. An ice making device according to any one of the preceding claims, further comprising a housing including a feed water tank mounting portion and a pump mounting portion, the feed water tank mounting portion mounting therein said feed water tank detachably, the pump mounting portion enclosing therein said pump.

8. An ice making device according to claim 7, further comprising a drain hole formed in a bottom plate of the pump mounting portion.

9. An ice making device according to claim 7 or 8, further comprising a vibration-proofing member supporting said pump in the pump mounting portion of said housing.

10. An ice making device according to claim 7, 8 or 9, further comprising an engaging member provided in said housing, the engaging member being designed to hold tight engagement between the first and second joints when said feed water tank is inserted into the feed water tank mounting portion of said housing.

11. An ice making device according to claim 7, 8, 9 or 10, further comprising a pressure member provided in said housing, the pressure member providing a preselected load to said feed

water tank when inserted into said housing.

12. An ice making device according to any one of claims 7 to 11, further comprising a discharge pipe storage portion provided in the feed water tank mounting portion of said housing, the discharge pipe storage portion guiding movement of said feed water tank to establish the engagement between the first and second joints of the first and second lines when the feed water tank is inserted into the feed water tank mounting portion.

13. An ice making device according to any one of the preceding claims, wherein said feed water tank includes a tank body and a cover detachably mounted on the tank body.

14. An ice making device according to claim 13, wherein said cover hermetically seals the tank body.

15. An ice making device constructed and arranged to operate substantially as hereinbefore described with reference to and as illustrated in Figures 1 to 15 of the accompanying drawings.

16. A refrigerator including an ice making device according to any one of the preceding claims.

Patents Act 1977 Examiner's report to the Comptroller under Section 17 (The Search report)	Application number GB 9415507.4
Relevant Technical Fields (i) UK Cl (Ed.M) F4H (ii) Int Cl (Ed.5) F25C	Search Examiner M C MONK Date of completion of Search 2 NOVEMBER 1994
Databases (see below) (i) UK Patent Office collections of GB, EP, WO and US patent specifications. (ii) ONLINE DATABASE : WPI	Documents considered relevant following a search in respect of Claims :- ALL

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